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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No.	A98054US
First Inventor or Application Identifier	James E. Hipp
Title	DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS
Express Mail Label No.	EM 517 002 857 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] * Fee Transmittal Form *(e.g., PTO/SB/17)* (Submit an original and a duplicate for fee processing)
2. [X] Specification [Total Pages 16]
   (preferred arrangement set forth below)
   - Descriptive title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. [X] Drawing(s) *(35 U.S.C. 113)* [Total Sheets 3]
4. Oath or Declaration [Total Pages]
   a. [X] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 C.F.R. § 1.63(d)) *(for continuation/divisional with Box 17 completed)* *[Note Box 5 below]*
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. [ ] Incorporation By Reference *(useable if Box 4b is checked)* The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. [ ] Microfiche Computer Program *(Appendix)*
7. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy)
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & document(s))
9. [ ] 37 C.F.R.§3.73(b) Statement *(when there is an assignee)* [X] Power of Attorney
10. [ ] English Translation Document *(if applicable)*
11. [X] Information Disclosure Statement (IDS)/PTO-1449 [X] Copies of IDS Citations
12. [ ] Preliminary Amendment
13. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
14. [X] * Small Entity Statement(s) *(PTO/SB/09-12)* [ ] Statement filed in prior application, Status still proper and desired
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [X] Other: Express.Mailing.Certificate

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17. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment:*
    [ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: _____/_____
    Prior application information: Examiner _____ Group / Art Unit: _____

18. CORRESPONDENCE ADDRESS

[ ] Customer Number or Bar Code Label *(Insert Customer No. or Attach bar code label here)* or [X] Correspondence address below

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Signature	Charles C Garvey Jr	Date	6/10/98

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FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1. These are the fees effective October 1, 1997. Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12. See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT ($) 395.00

Complete If Known	
Application Number	
Filing Date	
First Named Inventor	James E. Hipp
Examiner Name	
Group / Art Unit	
Attorney Docket No.	A98054US

METHOD OF PAYMENT (check one)

1. [X] The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 16-2435
Deposit Account Name: PRAVEL, HEWITT, KIMBALL

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	790	201	395	Utility filing fee	$395
106	330	206	165	Design filing fee	
107	540	207	270	Plant filing fee	
108	790	208	395	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 395

2. EXTRA CLAIM FEES

	Extra Claims		Fee from below	Fee Paid
Total Claims	16 -20** =	0	X 11	= 0
Independent Claims	3 -3** =	0	X 41	= 0
Multiple Dependent			135	= 0

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	22	203	11	Claims in excess of 20
102	82	202	41	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	82	209	41	** Reissue independent claims over original patent
110	22	210	11	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) -0-

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	950	217	475	Extension for reply within third month	
118	1,510	218	755	Extension for reply within fourth month	
128	2,060	228	1,030	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,320	241	660	Petition to revive - unintentional	
142	1,320	242	660	Utility issue fee (or reissue)	
143	450	243	225	Design issue fee	
144	670	244	335	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	790	246	395	Filing a submission after final rejection (37 CFR 1.129(a))	
149	790	249	395	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) _____

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($)

SUBMITTED BY

				Complete (if applicable)	
Typed or Printed Name	Charles C. Garvey, Jr.			Reg. Number	27,889
Signature	Charles Garvey	Date	6/10/98	Deposit Account User ID	

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Attorney Docket No. A98054US
Applicant(s): JAMES E. HIPP

CERTIFICATE OF EXPRESS MAILING

Assistant Commissioner For Patents
Box Patent Application
Washington, D.C. 20231

Dear Sir:

I hereby certify that the attached patent application, above-referenced, is being deposited with the United States Postal Service as Express Mail, Label No. EM 517 002 857 US, in an envelope addressed to: Assistant Commissioner For Patents, Box Patent Application, Washington, D.C. 20231-9999, on this 10 day of June, 1998.

SHANNON FORD

Shannon Ford

PATENT APPLICATION

Attorney Docket No. A98054US (67789/14)

TITLE OF THE INVENTION

"DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS"

INVENTOR: James E. Hipp, a U.S. citizen, of Lafayette, LA 70598.

CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable

REFERENCE TO A "MICROFICHE APPENDIX"

Not applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to oil and gas well drilling, and more particularly to an improved downhole jar apparatus that delivers upward blows and which is activated by pumping a valving member or activator ball downhole through a tubing string or work string. Even more particularly, the present invention relates to an improved downhole jar apparatus for use in oil and gas wells that includes upper and lower pistons that are each movable between upper and lower positions, the lower piston having a valve seat and a valving member that can be moved to seal the valve seat wherein a trip mechanism separates the second valving member from the lower piston seat when a predetermined pressure value is overcome and a return mechanism returns the first piston to its upper position when the trip mechanism separates the second valving member from the lower piston seat to deliver an upward jar to the tool body.

2. General Background of the Invention

In downhole well operation, there is often a need for jarring or impact devices. For example, such a "jar" is often used in work over operations using a pipe string or work string such as a coil tubing unit or a snubbing equipment. It is sometimes necessary to

provide downward jarring impact at the bottom of the work string to enable the string to pass obstructions or otherwise enter the well. During fishing operations or other operations, such as opening restriction (i.e., collapsed tubing) it is sometimes necessary to apply upward jarring or impact forces at the bottom of the string if the fishing tool or the like becomes stuck.

In prior U.S. Patent 3,946,819, naming the applicant herein as patentee, there is disclosed a fluid operated well tool adapted to deliver downward jarring forces when the tool encounters obstructions. The tool of my prior U.S. Patent 3,946,819, generally includes a housing with a tubular stem member telescopically received in the housing for relative reciprocal movement between a first terminal position and a second terminal position in response to fluid pressure in the housing. The lower portion of the housing is formed to define a downwardly facing hammer and the stem member includes an upwardly facing anvil which is positioned to be struck by the hammer. The tool includes a valve assembly that is responsive to predetermined movement of the stem member toward the second terminal position to relieve fluid pressure and permit the stem member to return to the first terminal position. When the valve assembly relieves fluid pressure, the hammer moves into abrupt striking contact with the anvil. The tool of prior U.S. Patent 3,946,819, is effective in providing downward repetitive blows. The tool of the '819 patent will not produce upwardly directed blows.

In prior U.S. Patent 4,462,471, naming the applicant herein as patentee, there is provided a bidirectional fluid operated jarring apparatus that produces jarring forces in either the upward or downward direction. The jarring apparatus was used to provide upward or downward impact forces as desired downhole without removing the tool from the well bore for modification. The device provides downward jarring forces when the tool is in compression,

as when pipe weight is being applied downwardly on the tool, and produces strong upward forces when is in tension, as when the tool is being pulled upwardly.

In U.S. Patent 4,462,471, there is disclosed a jarring or drilling mechanism that may be adapted to provide upward and downward blows. The mechanism of the '471 patent includes a housing having opposed axially spaced apart hammer surfaces slidingly mounted within the housing between the anvil surfaces. A spring is provided for urging the hammer upwardly.

In general, the mechanism of the '471 patent operates by fluid pressure acting on the valve and hammer to urge the valve and hammer axially downwardly until the downward movement of the valve is stopped, preferably by the full compression of the valve spring. When the downward movement of the valve stops, the seal between the valve and the hammer is broken and the valve moves axially upwardly. The direction jarring of the mechanism of the '471 patent is determined by the relationship between the fluid pressure and the strength of the spring that urges the hammer upwardly. Normally, the mechanism is adapted for upward jarring. When the valve opens, the hammer moves upwardly to strike the downwardly facing anvil surface of the housing.

BRIEF SUMMARY OF THE INVENTION

The downhole jar apparatus for use in oil and gas wells provides an improved construction that delivers upward blows only. The apparatus can be activated by pumping a valving member (e.g., ball) downhole via a coil tubing unit, work string, or the like.

The present invention thus provides an improved downhole jar apparatus for use in oil and gas wells that includes an elongated tool body that is supportable by an elongated work string such as a coil tubing unit. The tool body provides an upper end portion that attaches to the coil tubing unit with a commercially available sub for an example, and a lower end portion that carries a working

member. Such a working member can include for example, a pulling tool to extract a fish, down hole retrievable controls, a gravel pack or a safety jar, a motor or directional steering tool.

The tool body has a longitudinal flow bore that enables fluid to flow through the tool body from the upper end to the lower end.

An upper piston (first piston) is slidably mounted within the tool body bore at the upper end portion thereof. The upper piston is movable between upper and lower positions and provides a valve seat.

A lower piston (second piston) is mounted in the tool body in sliding fashion below the upper piston and is also movable between upper and lower positions. The lower piston also provides a valve seat. A first valving member preferably in the form of a ball valving member is provided for sealing the valve seat of the upper piston.

The first valving member is preferably pumped downhole via the coil tubing unit or work string using fluid flow to carry it to the valve seat of the upper piston. A second valving member in the form of an elongated dart is disposed in between the upper and lower pistons. The second valving member has a lower valving end portion that can form a seat with the lower piston seat.

A trip mechanism is provided for separating the second valving member from the lower piston seat when a predetermined hydrostatic pressure value above the lower piston is overcome by compression of a spring portion of the trip mechanism.

A return mechanism returns the first piston to its upper position when the trip mechanism separates the second valving member from the lower piston seat.

The tool body has an anvil portion positioned above the lower piston for receiving blows from the lower piston when it rapidly returns to its upper position, once separated from the second valving member.

The tool body can include upper and lower tool body sections attached together end to end with a slip joint. This allows the force of upward blows delivered by the piston to exceed the tension applied from the surface through the tubing string.

A tappet can be provided above the first piston, the tappet and first upper piston being separately movable members with a beveled seat interface provided at the connection between the bottom of the upper piston and the top of the tappet.

The tappet is used to momentarily interrupt fluid flow when the second or dart valving member fires upwardly. This interruption of fluid flow contributes to the rapid upward movement of the lower piston so that it can impact the tool body providing an upward jar.

BRIEF DESCRIPTION OF THE DRAWINGS

For a further understanding of the nature, objects, and advantages of the present invention, reference should be had to the following detailed description, read in conjunction with the following drawings, wherein like reference numerals denote like elements and wherein:

Figure 1A is a sectional elevational view of the preferred embodiment of the apparatus of the present invention illustrating the upper portion thereof;

Figure 1B is a sectional elevational view of the preferred embodiment of the apparatus of the present invention illustrating the central portion thereof; and

Figure 1C is a sectional elevational view of the preferred embodiment of the apparatus of the present invention illustrating the lower end portion thereof.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1A, 1B, and 1C show generally the preferred embodiment of the apparatus of the present invention designated generally by the numeral 10. Jar apparatus 10 is comprised of an elongated tool

body 11 having an upper end portion 12 and a lower end portion 13. The tool body 11 includes an upper tool body section 14 and a lower tool body section 15. The upper tool body section 14 is attached to the lower tool body section 15 through slip joint 46.

The tool body 11 has an elongated open ended flow bore 16 so that fluids can be pumped through the tool body 11 from the upper end 12 to the lower end 13.

At the upper end 12 of tool body 11, there is provided a first piston 17 having an O-ring 18 for forming a seal with tool body bore 16. Piston 17 sits upon tappet 23. The tappet 23 has a seat 19 that receives a ball valving member 20 that is dropped from the surface through a work string, coil tubing unit, or the like, so that the ball can be pumped down to the tool body 11 and into the bore 16 so that it registers upon the seat 19.

The upper end 12 of the tool body 11 provides internal threads 21 for forming a connection with a work string, coil tubing string, or the like. A commercially available connecting member or sub can be used to form an interface in between the tool body 11 and the coil tubing unit, work string, or the like. At its lower end portion, tappet 23 provides a generally flat surface 24 that receives a correspondingly shaped flat surface of dart valving member 31. Bore 16 enlarges below tappet 23 at 26. Annular shoulder 25A limits downward movement of piston 17 at shoulder 25B.

Flow channel 27 enables fluid to flow through the center of tappet 23 and around the tappet 23 as shown by arrows 29 in Figure 1A. The center of the tappet 23 thus provides a tappet channel 28 through which fluid can flow when the seat 19 is not occupied by ball valving member 20. Annular seat 30 can include beveled surfaces on piston 17 and tappet 23 to form a sealing interface in between the bottom of upper piston 17 and the top of tappet 23. Dart valving member 31 has an upper end portion 32 and a lower end portion 38. A flat surface 39 at lower end 38 can form a seal with

seat 37 of second, lower piston 36.

To begin operation of the device, a shear pin or shear pins 34 (Figure 1B) affix the position of dart valving member 31 in a fixed position relative to tool body 11. The ball valving member 20 is dropped from the surface via the flow bore of a coil tubing unit, work string, or the like. The ball valving member 20 is transmitted to the bore 16 using fluid flow. The ball valving member enters bore 16 at upper chamber 35 immediately above tappet 23 and piston 17. The ball valving member then registers upon seat 19 as shown by the phantom lines indicating the position of ball valving member 20 in Figure 1A when it is forming a seal upon seat 19.

When the dart valving member 31 is pinned in place with shear pins 34, pumping fluid can pass through the tappet channel 28 and into flow channel 27 along the path indicated by arrows 29 in Figure 1A. To activate the tool, the ball valving member 20 is pumped down from the surface via a coil tubing unit, work string or the like to the bore 16 and above piston 17 into upper chamber 35.

The ball valving member 20 seats upon seat 19 sealing the upper chamber and thus discontinuing the flow of fluid through the tool body 11. Hydrostatic pressure then builds up in upper chamber 35 above piston 17 due to the ball valving member 20 sealing upon seat 19. Upper piston 17 has O-ring 18 that also contributes to the seal.

When pressure differential builds up sufficiently across piston 17, valve 31 is pressured down and the shear pin (or pins) 34 shear, allowing the dart valving member 31 with its flat valve surface 39 to move downwardly in tool body 11, and seal upon seat 37 of lower piston 36. Once this seal occurs at seat 37, pressure builds up in bore 16 of tool body 11 above seat 37 and above piston 36. Seals 40 are provided on piston 36.

The combination of the seals 40, the piston 36, and the seal of flat valving surface 39 upon seat 37 causes the lower piston 36 to move downwardly, gradually compressing and storing more and more energy in spring 43. At this time, the dart valving member 31 is held in position upon seat 37 by pressure differential above seat 37, thus pulling the dart valving member 31 downwardly, also storing energy in trip spring 50. The upper end 32 of dart valving member 31 provides a beveled annular surface 51 that corresponds in shape to the beveled annular surface 52 of trip washer 49.

When the dart valving member 31 and trip washer 49 move down as trip spring 50 is collapsed, the trip washer 49 encounters annual shoulder 47, breaking the seal at seat 37 between valving member 31 and piston 36. The trip spring 50 then causes the valving member to rapidly fly upwardly, its flat surface 33 striking the correspondingly shaped flat surface 24 of tappet 23. This action of valving member 31 striking tappet 23 creates a momentary seal at seat 30, interrupting incoming fluid flow. This flow interruption also allows the piston 36 to move upwardly in the tool body 11 very rapidly, striking an impact ledge or anvil in the form of an annular shoulder 53 (see Figure 1B).

The tool upper body section 14 is attached to the lower tool body section 15 through slip joint 46. This allows the force of the upper blow delivered by piston 36 to exceed the tension applied from the surface through the coil tubing unit, work string or tubing string. The tension is transmitted from upper tool body section 14 to lower tool body section 15 through annular shoulders 54, 55. The slip joint can be attached to the lower tool body section 15 using threaded connection 56 and set screws 57.

The following table lists the parts numbers and parts descriptions as used herein and in the drawings attached hereto.

PARTS LIST

Part Number	Description
10	apparatus
11	tool body
12	upper end
13	lower end
14	upper tool body section
15	lower tool body section
16	longitudinal flow bore
17	piston
18	O-ring
19	seat
20	ball valving member
21	internal threads
22	external threads
23	tappet
24	flat surface
25A	annular shoulder
25B	annular shoulder
26	bore
27	flow channel
28	tappet channel
29	arrow
30	seat
31	dart valving member
32	upper end
33	flat surface
34	shear pin
35	upper chamber
36	piston
37	seat
38	lower end

39	flat surface
40	seal
41	flow bore
42	rib
43	spring
44	annular shoulder
45	annular shoulder
46	slip joint
47	annular shoulder
48	annular shoulder
49	trip washer
50	trip spring
51	beveled annular surface
52	beveled annular surface
53	impact ledge
54	annular shoulder
55	annular shoulder
56	threaded connection
57	set screw

The foregoing embodiments are presented by way of example only; the scope of the present invention is to be limited only by the following claims.

CLAIMS

1. A downhole jar apparatus for use in oil and gas wells, comprising:

a) an elongated tool body having an upper end portion and a lower end portion, and a longitudinal flow bore that enables fluid to flow through the tool body from the upper end to the lower end;

b) an upper piston mounted at the upper end portion of the tool body, movable between upper and lower positions and having a valve seat;

c) a lower piston mounted below the upper piston, movable between upper and lower positions and having a valve seat;

d) a first valving member for sealing the valve seat of the upper piston so that hydrostatic pressure can build up above the upper piston;

e) a second valving member disposed in between the upper and lower piston and having a lower valving end portion that forms a seat with the lower piston seat, the second valving member being movable downwardly in the tool body bore responsive to a pressure increase above the upper piston;

f) a trip mechanism for separating the second valving member from the lower piston seat when a predetermined pressure value is overcome;

g) a return mechanism for returning the first piston to its upper position when the trip mechanism separates the second valving member from the lower piston seat; and

h) wherein the tool body has an anvil portion positioned above the lower piston for receiving force from the lower piston when it is returned to its upper position by the return mechanism.

2. The jar apparatus of claim 1 wherein the tool body

includes upper and lower tool body sections attached together end to end with a slip joint.

3. The jar apparatus of claim 1 wherein the first valving member is a member that can be transmitted to the tool body via a work string.

4. The jar apparatus of claim 3 wherein the first valving member is a ball shaped valving member.

5. The jar apparatus of claim 1 further comprising a tappet that is positioned below the upper piston and above the second valving member.

6. The jar apparatus of claim 5 wherein the tappet and upper piston are separately movable members, and a seat interface is provided at the interface between the bottom of the upper piston at top of the tappet.

7. The jar apparatus of claim 1 wherein the second valving member has a generally flat upper end.

8. The jar apparatus of claim 1 wherein the second valving member has a generally flat lower end.

9. The jar apparatus of claim 1 wherein the trip mechanism includes a compressible member.

10. The jar apparatus of claim 9 wherein the compressible member is a spring.

11. The jar apparatus of claim 9 wherein the trip mechanism

includes a compressible spring and a trip washer that cooperates with an annular shoulder on the tool body to separate the second valving member from the lower piston as the second valving member moves downwardly in the tool body.

12. The jar apparatus of claim 1 wherein the return mechanism includes a compressible member.

13. The jar apparatus of claim 12 wherein the compressible member is a spring.

14. The jar apparatus of claim 1 wherein the valving member is preliminarily secured to the tool body with one or more shear pins that shear as hydrostatic fluid pressure is increased.

15. A downhole jar apparatus for use in oil and gas wells, comprising:

a) an elongated tool body supportable by a work string and having an upper end portion and a lower end portion, and a longitudinal flow bore that enables pressurized fluid to flow through the tool body from the upper end to the lower end;

b) an upper piston mounted at the upper end portion of the tool body, movable between upper and lower positions and having a valve seat;

c) a lower piston mounted below the upper piston, movable between upper and lower positions in the tool body and having a valve seat;

d) a first valving member for sealing the valve seat of the upper piston so that pressurized fluid can build hydrostatic pressure above the first valving member and upper piston;

e) wherein the upper piston is an assembly that includes an upper piston member and a tappet that carries the upper

piston seat, the tappet and upper piston member being separable members that move downwardly together when the first valving member seals upon the valve seat of the upper piston assembly;

f) a second valving member disposed in between the upper and lower pistons and having a lower valving end portion that forms a seat with the lower piston seat;

g) a trip mechanism for separating the second valving member from the lower piston seat when a predetermined pressure value in the tool body flow bore above the upper piston and first valving member is overcome;

h) a return mechanism for returning the first piston to its upper position when the trip mechanism separates the second valving member from the lower piston seat; and

i) wherein the tool body has an anvil portion positioned above the lower piston for receiving force from the lower piston when it is returned to its upper position by the return mechanism.

16. A downhole jar apparatus for use in oil and gas wells, comprising:

a) an elongated tool body supportable by a work string and having an upper end portion and a lower end portion, and a longitudinal flow bore that enables pressurized fluid to flow through the tool body from the upper end to the lower end;

b) an upper piston mounted at the upper end portion of the tool body, movable between upper and lower positions and having a valve seat;

c) a lower piston mounted below the upper piston, movable between upper and lower positions in the tool body and having a valve seat;

d) a first valving member for sealing the valve seat of the upper piston so that pressurized fluid can build hydrostatic

pressure above the first valving member and upper piston;

e) a second valving member disposed in between the upper and lower pistons and having a lower valving end portion that forms a seat with the lower piston seat;

f) a trip mechanism for separating the second valving member from the lower piston seat when a predetermined pressure value in the tool body flow bore above the upper piston and first valving member is overcome;

g) a return mechanism for returning the first piston to its upper position when the trip mechanism separates the second valving member from the lower piston seat; and

h) an anvil carried by the tool body for receiving blows from the lower piston when the lower piston travels upwardly in the tool body.

ABSTRACT OF THE DISCLOSURE

A downhole jar apparatus for use in oil and gas wells provides an improved construction that features a movable piston that imparts upward blows to the tool body during use. The apparatus includes an elongated tool body having upper and lower end portions and a longitudinal flow bore for enabling fluid to pass from the upper end of the tool body to the lower end portion thereof. A pair of pistons are slideably mounted within the tool body including an upper piston having a seat and a lower piston having a seat. A ball valving member is used to seal the upper piston, that ball valving member being pumped down through a work string such as a coiled tubing unit in order to reach the seat of the upper piston. A second valving member in the form of an elongated dart is disposed in between the two pistons. A trip mechanism separates the second valving member from the lower piston when a predetermined hydrostatic pressure value is overcome. Once the second valving member and lower piston are separated, the second piston is fired upwardly striking an anvil portion of the tool body to create the upward jar or blow.

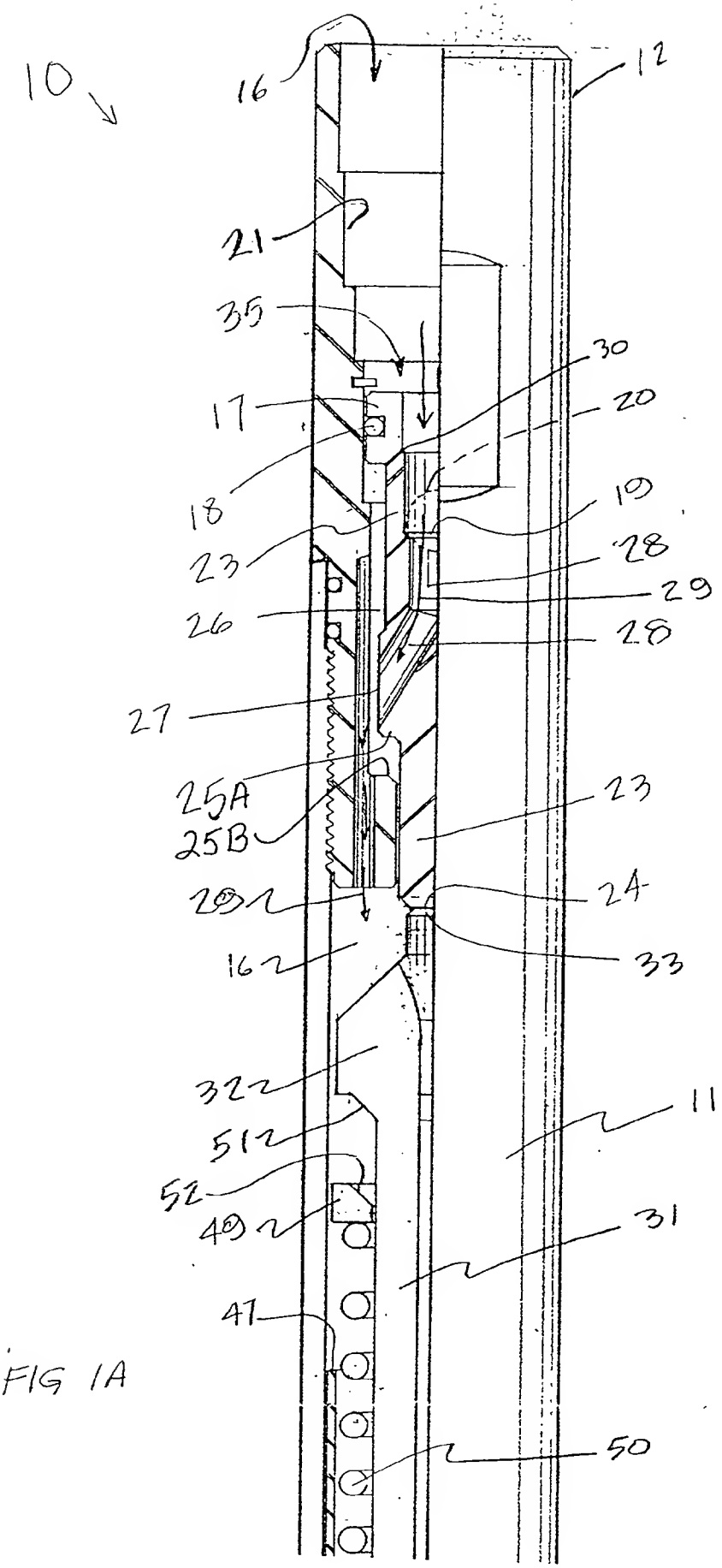
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FIG 1A

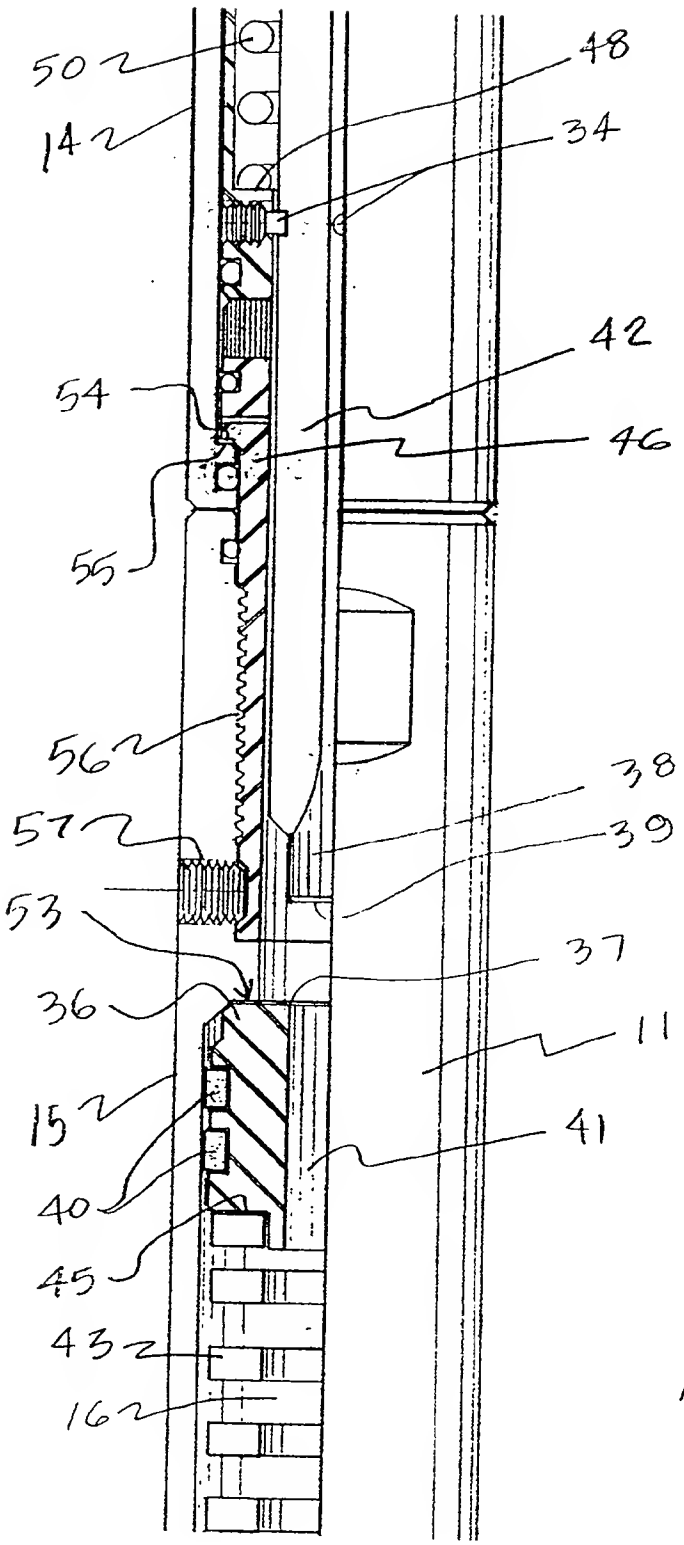

FIG. 1B

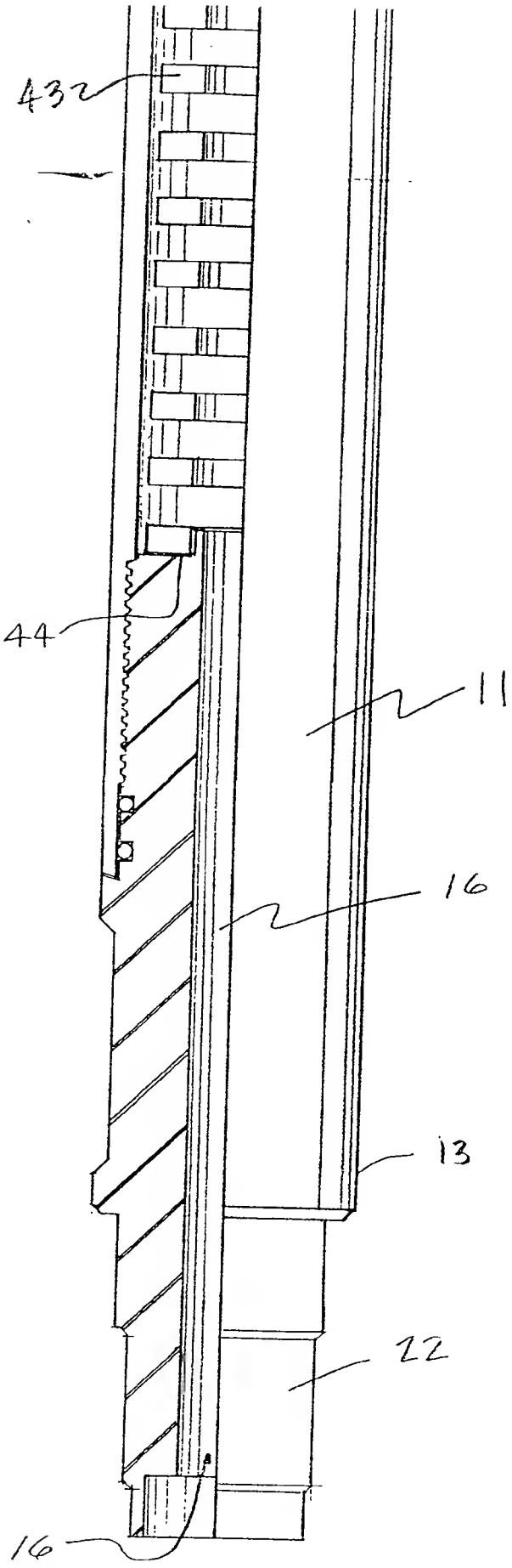

FIG 1C

FORM 100 VERSION 1.0 (October 27, 1990)

Attorney Docket No. A98054US

DECLARATION

SOLE/JOINT INVENTOR
ORIGINAL/SUBSTITUTE/CIP

As a below named inventor, I hereby declare that: my residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS"

as described in the specification ☒ attached or [ ] of patent Application Serial No. _____, filed _____

and amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above; that I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months prior to this application; and that I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations § 1.56(a). Such information is material when it is not cumulative to information already of record or being made of record in the application, and

(1) it establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) it refutes, or is inconsistent with, a position the applicant has taken or may take in:

(i) opposing an argument of unpatentability relied on by the Office, or

(ii) asserting an argument of patentability.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificates listed below and have also identified below any foreign application(s) having a filing date before that of the application(s) on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE OF FILING	PRIORITY CLAIMED UNDER 35 USC 119
			☐ YES ☐ NO
			☐ YES ☐ NO

I hereby claim the benefit under Title 35 United States Code § 120 of any United States application(s) listed below and, insofar as any subject matter of any claim of this application is not disclosed in the prior United States Application, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations § 1.56(a) which occurred between the filing date of the prior application and the national PCT international filing date of this application:

_____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE OR FIRST INVENTOR	INVENTOR'S SIGNATURE	DATE
JAMES E. HIPP		6/10/98
RESIDENCE		CITIZENSHIP
NEW IBERIA, LA 70560		U.S.
POST OFFICE ADDRESS		
110 LEITMEYER, NEW IBERIA, LA 70560		
FULL NAME OF SECOND JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF THIRD JOINT INVENTOR, IF ANY	INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): JAMES E. HIPP	§	*Group Art Unit:*
Filed: Herewith	§	*Examiner:*
Serial No.:	§	
For: "DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS"	§	*Atty File:* A98054US

POWER OF ATTORNEY BY ASSIGNEE

Under the provisions of 37 C.F.R. § 1.32, the undersigned assignee of record of the entire interest in the above-identified patent/patent application by virtue of an assignment recorded (check as applicable):

[X] Concurrently Herewith
[ ] Date Recorded _____
Reel _____ Frame _____

elects to conduct the prosecution of the application/maintenance of the patent to the exclusion of the inventor(s). The assignee hereby revokes any previous powers of attorney and appoints the following to prosecute this application/maintain this patent and transact all business in the Patent and Trademark Office connected therewith:

CHARLES C. GARVEY, JR.	Reg. No. 27,889
GREGORY C. SMITH	Reg. No. 29,441
SETH M. NEHRBASS	Reg. No. 31,281

Please direct all communications to: **PRAVEL, HEWITT, KIMBALL & KRIEGER**, 1177 West Loop South, 10th Floor, Houston, Texas 77027-9095, (713)850-0909, to the attention of: CHARLES C. GARVEY, JR.

ASSIGNEE
SONOMA CORPORATION

Date: MAY 7TH 1998

By: _____

NAME: JAMES E. HIPP

TITLE: President

67789012.POA/mkf

Attorney Docket No. A98054US

Applicant(s): JAMES E. HIPP
Serial No.:
Filed: Herewith
For: "DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled "DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS" by inventor(s) James E. Hipp described in:

XX the specification filed herewith.
___ application serial No. _____, filed _____.
___ patent No. _____, issued _____.

I have not assigned, granted, conveyed, or licensed and am undemo obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which Ihave assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

____ no such person, concern, or organization
XX persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

FULL NAME: SONOMA CORPORATION

ADDRESS: P. O. BOX 81094, LAFAYETTE, LA 70598-1094
( ) INDIVIDUAL (X) SMALL BUSINESS CONCERN ( ) NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

JAMES E. HIPP		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature/Inventor	Signature/Inventor	Signature/Inventor
5/29/98		
DATE	DATE	DATE

Attorney Docket No. A98054US

Applicant(s): JAMES E. HIPP
Serial No.: Filed: Herewith
For: "DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

_____ the owner of the small business concern identified below:
_XX_ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: SONOMA CORPORATION
ADDRESS OF CONCERN: P. O. BOX 81094, LAFAYETTE, LA 70598-1094

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR §121.3-18, and reproduced in 37CFR §1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled "DOWNHOLE JAR APPARATUS FOR USE IN OIL AND GAS WELLS" by inventor(s) James E. Hipp described in:

_XX_ the specification filed herewith
_____ application serial No. ____, filed _____.
_____ patent No. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR §1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

FULL NAME: _____
ADDRESS: _____
( ) INDIVIDUAL ( ) SMALL BUSINESS CONCERN ( ) NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR §1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: James E. Hipp
TITLE OF PERSON OTHER THAN OWNER: President
ADDRESS OF PERSON SIGNING: P. O. Box 81094, Lafayette, LA 70598-1094

SIGNATURE _____ DATE 7-7-98